

# Assignment 2

Tanay Yadav - AI20BTECH11026

Download the python codes from

<https://github.com/tanayyadav28/Assignments/blob/main/Assignment%202/code/assignment2.py>

and latex-tikz codes from

<https://github.com/tanayyadav28/Assignments/blob/main/Assignment%202/assignment2.tex>

## 1 PROBLEM

(Prob 5.21) Savita and Hamida are friends.

What is the probability that both will have

(i) different birthdays?

(ii) the same birthday?

(ignoring a leap year).

## 2 SOLUTION

Let the Bernoulli random variable  $X = \{0, 1\}$  denote the outcome of the given experiment.

$X = 0$  denotes the outcome that Savita and Hamida have their birthdays on a *same day* of the year.

$X = 1$  denotes the outcome that Savita and Hamida have their birthdays on *different days* of the year.

$$\Pr(X = 0) = \frac{1}{365} \quad (2.0.1)$$

$$\therefore \Pr(X = 0) = 0.00273972 \quad (2.0.2)$$

$$\therefore \Pr(X = 0) + \Pr(X = 1) = 1 \quad (2.0.3)$$

$$\therefore \Pr(X = 1) = 1 - \Pr(X = 0) \quad (2.0.4)$$

Putting the value of  $\Pr(X = 0)$  from (2.0.1) in (2.0.4)

$$\therefore \Pr(X = 1) = 1 - \frac{1}{365} \quad (2.0.5)$$

$$\therefore \Pr(X = 1) = \frac{364}{365} \quad (2.0.6)$$

$$\therefore \Pr(X = 1) = 0.99726027 \quad (2.0.7)$$